Amendments to the Specification:

In [004]:

An optical storage media, such as a compact disc, has the advantages of low-cost and impressive-high data storage capacity and has becoming become one of the most popular data storage medias. Consequently, a CD drive for accessing data stored in a compact disc has becoming become a standard piece of equipment of in a personal computer in during recent years.

In [006]:

In general, the focus & track servo system of the CD drive for controlling the actuator comprises a phase-lead compensator and a phase-lag compensator. Please refer to Fig.1, which is a Bode plot of a first-order phase-lead compensator according to the prior art. The phase-lead compensator has a frequency response of $G(s)=(1+aT_{lead}s)/(1+T_{lead}s)$, where a is larger than one. Since the phase-lead compensator is added to the system, and the added pole corresponding to the phase-lead compensator has a negative number smaller than that of the added zero, the phase-lead compensator contributes that an intersection of the asymptotes along the real axis in a root locus is moved further into the left half plane, and the entire root locus is shifted leftward, this increasing the region of stability as well as the response speed. The phase-lead compensator has a side effect of adding a positive phase of a value between zero and 90 degrees to the system over two corner frequencies $1/aT_{lead}$ and $1/T_{lead}$. The phase-lead compensator will inevitably increase the total phase of the system.

In [007]:

Please refer to Fig.2, which is a Bode plot of a first-order phase-lag compensator

according to the prior art. The phase-lag compensator has a frequency response of $G(s)=(1+aT_{lag}s)/(a*(1+T_{lag}s))$, wherein a is less than one. The phase-lag compensator also has a side effect of adding a negative phase instead of a positive phase over two corner frequencies $1/T_{lag}$ and $1/aT_{lag}$. Since the phase-lag compensator is added to the system, and the added pole/zero corresponding to the phase-lag compensator are closer to the origin than the original poles/zeros are, the phase-lag compensator causes the entire root to be shifted rightward. Although the added phase-lag compensator does not appreciably change the transient response or stability characteristics of the system, the phase-lag compensator can still improve the system's steady-state error. In contrast to the phase-lead compensator, the phase-lag compensator adds a negative phase to the system and is capable of compensating the added positive phase provided by the phase-lead compensator.

In [027]:

The error signal input into the compensator circuit 56 enters into the phase-lead compensator 62 and band-pass filter 64 simultaneously. A filtered signal amplified by the band-pass filter 64 has a frequency close to that of a rotating frequency error signal produced by a motor of the CD drive in high-speed operation. In the preferred embodiment, since the band-pass filter 64 is capable of handling the rotating frequency error signal produced by the motor no matter how fast the speed the CD drive is operating at is, the CD drive can ~~runs~~ run at a any speed ~~without a limit~~.